STATEMENT OF SCOTT DONNELLY

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Thank you Mr. Chairman, Ranking Member Hooley and Members of the House Research Subcommittee of the Committee on Science.

My name is Scott Donnelly, and I am the Senior Vice President for Global Research for the General Electric Company. I am appearing here today to give you our perspective on the challenges and opportunities in the emerging field of nanotechnology.

The term "nanotechnology" has quickly become one of the latest and greatest buzzwords and can mean different things to different people. At GE, we define nanotechnology as the "ultimate material science", and we believe that the novel material properties found at the nano scale can be leveraged to create completely new material performance levels for a wide spectrum of products and applications. The focus of our program at GE Research is to leverage these novel properties that are found at the nano scale and develop methods to build materials from the nano scale up to the macro world to capitalize on the enhanced performance characteristics demonstrated by these materials.

We believe that nanotechnology has the potential to impact numerous industries. Some examples include:

- Energy, where new materials may enable improved machine efficiency and decreased emissions or enable alternative energy technologies
- Transportation, where the development of new, lighter, stronger materials could increase jet engine efficiency
- Homeland Security, where nanomaterials may lead to improved and faster detection of chemical and biological threats
- Healthcare, where the development of improved diagnostic agents and equipment may lead to the diagnosis of diseases before symptoms even appear
- Defense applications, where the development of new materials may better protect our soldiers or their vehicles or enable more electric ships.

It is difficult to predict which industries are most likely to be impacted in the near-term and which will be impacted in the longer-term. What is more likely is that in the nearer-term we will see nanotechnology making relatively incremental improvements to currently existing products; such as coatings for plastic and metals, or as additives to existing products. As with all new technologies, it will take longer to realize the truly revolutionary, game-changing technologies that will certainly come from nanotechnology.

What is important to realize, is that this adoption and development route is not unique to “nanomaterials”, but is typical for all new material development.

The primary barriers to commercialization of nanotechnology lie in the translation of a scientific innovation to a productive and cost-effective technology. The process of transitioning a successful experiment or even a prototype in a laboratory to a reproducible, high quality, cost effective manufacturing process is a time consuming and expensive hurdle for any invention. And even more challenging with high risk, emerging technologies And in this context it is important to understand that nanotechnology is not an industry, but that it is an enabling technology that will likely impact many industries, but that the challenges and solutions for one area do not necessarily (and probably will not) translate to other sectors.

The barriers to commercializing nanotechnology are not unique and are in fact the same for any new product or application and will require significant time and money—both from private industry and the government—to overcome. In addition, another hurdle nanotechnology will need to overcome as it is commercialized is the need to develop unique manufacturing processes to preserve the novel properties of the nanomaterials. To date there has been a large body of research in nanotechnology that has been done at Universities and there has been a significant effort to establish nano-based centers and user facilities at universities and national laboratories. Much of this has been done as part of the National Nanotechnology Initiative and has provided solid scientific innovation in the field of nanotechnology. In addition, this investment has started to lay the foundation for the nano-workforce that will be required in the future. Scientists and engineers across multiple disciplines, including chemistry, biology, physics, medicine, electronics, and engineering, will need not only to be able to work at the nano-scale but they will also need to have the ability to understand and develop new materials, devices, and systems that have fundamentally new properties and functions because of their nanostructure and because of the convergence of these multiple disciplines. Since GE has it’s own corporate research center, we don’t typically need the infrastructure provided by the user centers and facilities, and so we have had limited interaction with these sites. We do collaborate with Universities as part of our nanotechnology program, as well as other research programs, and we have found the NSF Goali program to be a good mechanism for collaborating with Universities.

In closing, the nation’s nanotechnology program is poised to transition to the next phase of it’s development. The effort to date has resulted in well-done science, and should continue, but the next phase must also address nanotechnology development—that is making nanotechnology a reality, so that the full economic potential of nanotechnology and the benefit to the nation can be realized.

Thank you Mr. Chairman for the opportunity to testify today, and I welcome any questions.